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Title	Orphan Sources and Fresh Fallout: Virtual Exercise in Mobile Measurement (ORPEX)
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Abstract	In recent years carborne gamma spectrometry has expanded from its role as a geological survey platform to serving as a useful asset in the field of emergency response to radiological and nuclear situations. Its two main applications are searching for orphan sources and for surveying in the aftermath of an accident involving the release of radioactive materials. Despite this expansion, the opportunities for gaining practical experience in the field are limited by cost considerations and practicability. These limitations are exacerbated by the fact that data generated and displayed in the field differ significantly from gamma spectral data generated in a laboratory environment. As a means of exercising existing emergency measuring/surveying capability and introducing carborne measurements to a larger group, a virtual exercise was devised. The exercise ORPEX (Orphan Sources and Fresh Fallout Virtual Exercise in Mobile Measurement) featured two typical emergency scenarios in which carborne measuring systems might be deployed: firstly a search for multiple orphan sources and secondly surveying to delineate patchy fallout from a local release point. In the first scenario, synthetic spectral data were generated for imaginary point sources and inserted into genuine carborne measurements from in the Trondheim area of Norway. Participants were presented with a typical software tool and data in a range of typical formats and asked to report the source locations and isotopes within a time limit. In the second scenario, synthetic spectral data representing fallout from a local fire involving radioactive material were added to real carborne data from the Trondheim area. Participants were asked to produce maps that identify and characterise the regions of contamination within the same time limit. Fourteen individual organisations from seven different countries supplied results. Results from participants indicate that for strong sources of isotopes with simple spectra featuring high energy peaks, location and identification is not a problem. Problems arise for isotopes with low energy signals or that present a weak signal even when visible for extended periods. Experienced analysts tended to perform better in identification of sources even if they were inexperienced in mobile measurements whereas those with experience in such measurements were more confident in providing more precise estimates of location. The results indicated the need for the inclusion of less frequently encountered sources in field exercise related to mobile measurements.
Key words	Mobile gamma spectrometry, orphan sources, exercise

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